16 November 2019, Lucknow

Sustainability Assessment of Urban Public Transport System:

Sustainable Urban Transport Index (SUTI)

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UNITED NATIONS ESCAP
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Global & Regional Mandates on Urban Mobility

- *Target 11.2: By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons*

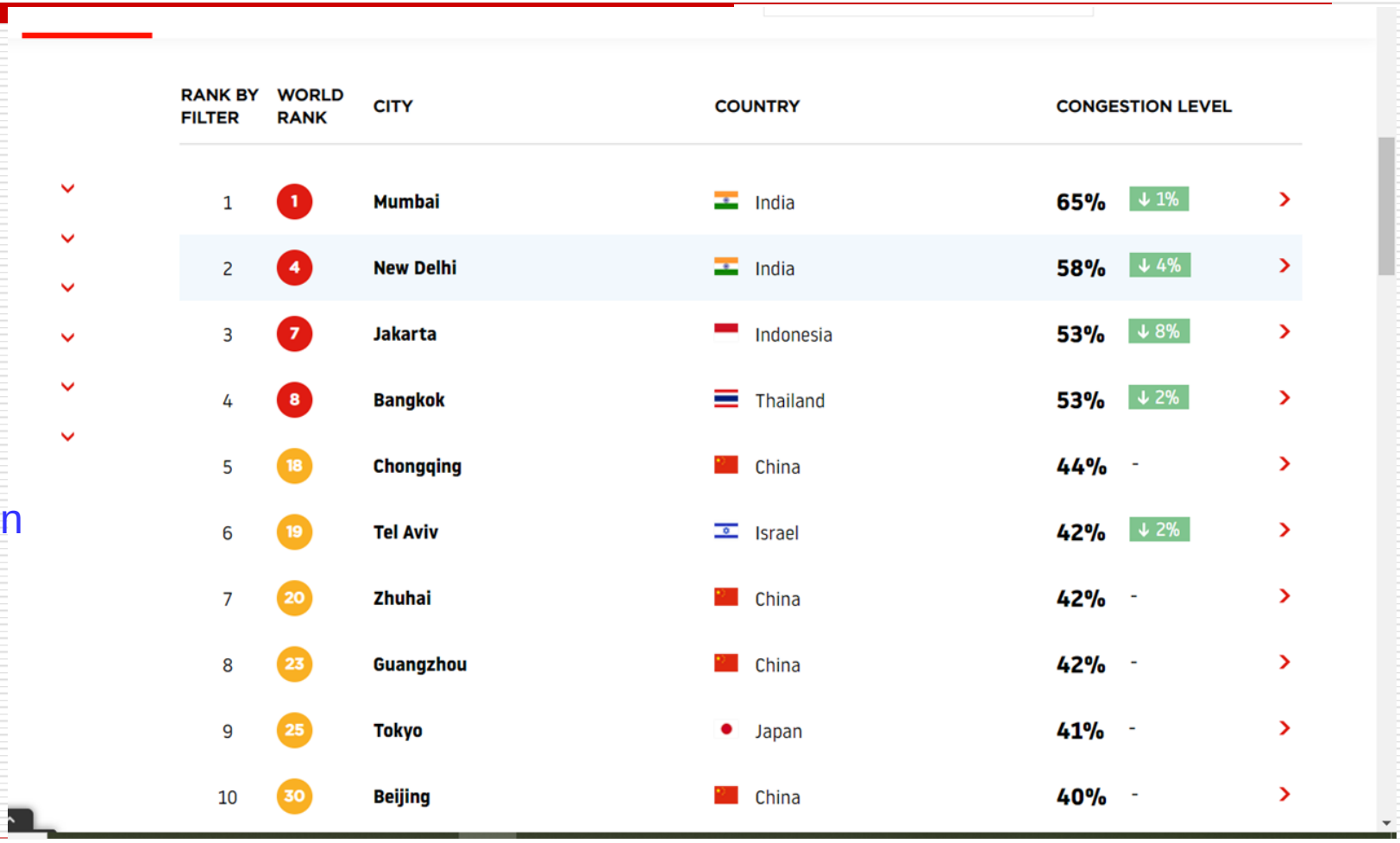
- New Urban Agenda, 2016
  - Promote access for *all-safe, affordable, sustainable urban mobility*
  - TOD
  - Develop Comprehensive Mobility Plan
  - Develop *mechanisms and frameworks*
  - Greater *coordination of implementation*

- Regional Action Programme on Sustainable Transport Connectivity (2017-2021): Sustainable urban transport

Urban Mobility in Asian cities

- Cities with good example of public transport : Tokyo, Singapore, Seoul, Hong Kong, China
- Mass transit system: Bangkok, Beijing, Delhi, Jakarta, Kuala Lumpur, Moscow, Tehran, Lucknow, etc.
- Bus Rapid Transit: Many cities in China (20) and India (8)
  - 44 Asian cities, 1624 route Km, 9.47 mil passengers/day
  - Tehran highest capacity-2 m, Jakarta longest route-207 km
- Cities of least developed and land locked countries
  - Mass transit: Almaty, Baku, Tashkent and Yerevan
  - Public mass transport in still developing stage
- Non-Motorized Transport: A significant population depends on walking & bicycling
- Bus service, para-transit, private vehicles

Traffic Congestion in Asian Cities

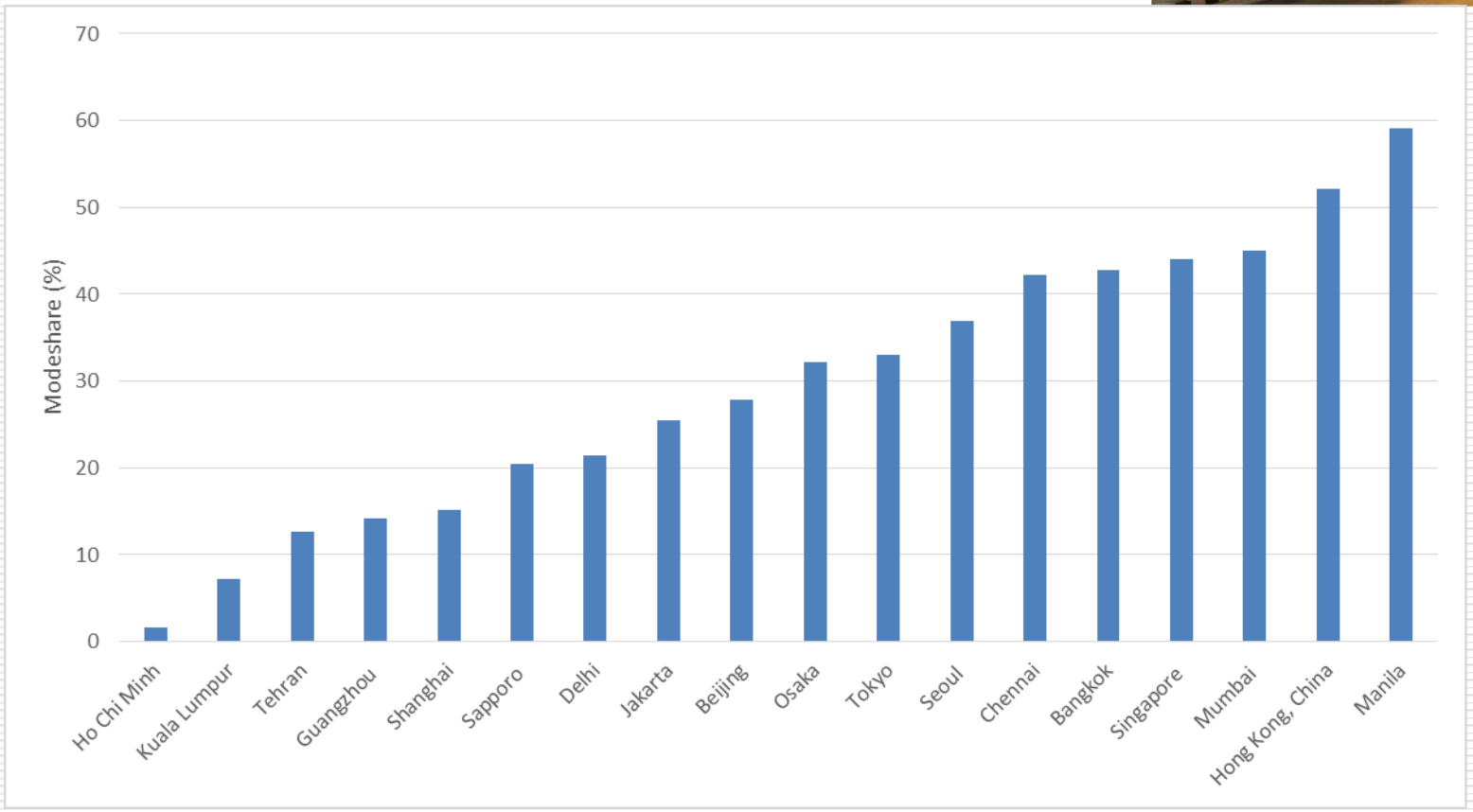


RANK BY FILTER	WORLD RANK	CITY	COUNTRY	CONGESTION LEVEL	
1	1	Mumbai	India	65%	↓ 1%
2	4	New Delhi	India	58%	↓ 4%
3	7	Jakarta	Indonesia	53%	↓ 8%
4	8	Bangkok	Thailand	53%	↓ 2%
5	18	Chongqing	China	44%	-
6	19	Tel Aviv	Israel	42%	↓ 2%
7	20	Zhuhai	China	42%	-
8	23	Guangzhou	China	42%	-
9	25	Tokyo	Japan	41%	-
10	30	Beijing	China	40%	-

% change in travel time

Source: Tomtom Traffic Index 2018

Public transport mode share in Asian cities



Capital costs of development of different mass transit systems

City	Type of system	Length, Km	Cost per km (mil $/km)
Janamarg, Ahmedabad	BRT	82	2.4
Kuala Lumpur (PUTRA)	Elevated rail	29	50.0
Kuala Lumpur Monorail	Monorail	8.6	38.1
Bangkok (BTS)	Elevated rail	23.7	72.5
Beijing Metro	Metro rail	113	62.0
Shanghai Metro	Metro rail	87.2	62.0
Bangkok MRTA	Metro rail	20	142.9
Hong Kong Subway	Metro rail	82	220

Source: Wright and Hook, 2007 and D. Hidalgo and A. Carrigan, 2010

Sustainable Urban Transport Index (SUTI)

- To **measure sustainability** of urban transport and progress towards SDG target 11.2
- To help **summarize, compare and track** the performance of urban transport in cities
- To **facilitate** discussion to develop plans and policies to improve urban transport
- **Simple Approach:**
  - Not too many indicators
  - Not complex calculations,
  - Simple, based on existing methodology, policies
- **Framework:** Sustainable Development, Sustainable Mobility, relevant SDG targets

Identification of potential indicators

- Extensive literature review of indicators
- **420** individual urban transport indicators identified
- Reduced to a **shortlist** of 20 most relevant indicators
- **Subjectively scored** using two sets of criteria
  - **Relevance** for Sustainable Transport framework
  - **Methodological** quality
- **Consultative process with cities, countries and experts**
- Reviewed & agreed at two UNESCAP meetings:
  - Expert Group Meeting, Kathmandu, September 2016
  - Regional Meeting, Jakarta, March 2017
- Resulting list of **10 indicators** in **four domains** :
  - Transport system, Social, Economic & Environmental domain

10 SUTI Indicators

No	Indicators	Measurement units	Weights	Range	
				MIN	MAX
1	Extent to which transport plans cover public transport, intermodal facilities and infrastructure for active modes	0 - 16 scale	0.1	0	16
2	Modal share of active and public transport in commuting	Trips/mode share	0.1	10	90
3	Convenient access to public transport service	% of population	0.1	20	100
4	Public transport quality and reliability	% satisfied	0.1	30	95
5	Traffic fatalities per 100,000 inhabitants	No of fatalities	0.1	10	0
6	Affordability – travel costs as part of income	% of income	0.1	35	3.5
7	Operational costs of the public transport system	Cost recovery ratio	0.1	22	100
8	Investment in public transportation systems	% of total investment	0.1	0	50
9	Air quality (pm10)	µg/m3	0.1	150	10
10	Greenhouse gas emissions from transport	CO2 Eq. Tons	0.1	2.75	0
	SUM		1.00		

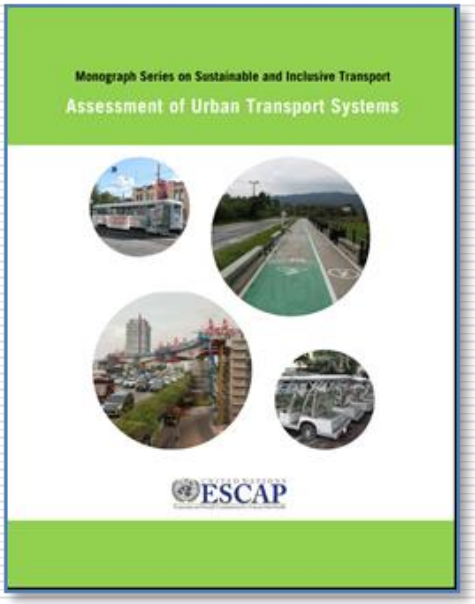
SUTI-Publication, Data Collection Guidelines & Excel Calculation Sheet

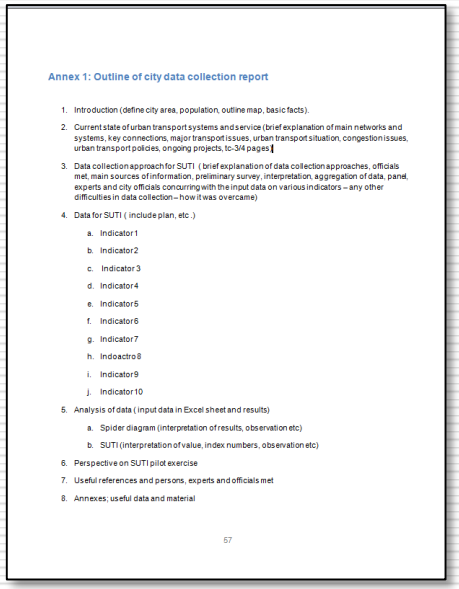
Monograph Series- Assessment of Urban Transport Systems

http://www.unescap.org/publications/monograph-series-sustainable-and-inclusive-transport-assessment-urban-transport-systems

Data Collection Guideline

http://www.unescap.org/events/capacity-building-workshop-sustainable-urban-transport-index-suti




Annex 1: Outline of city data collection report

1. Introduction (define city area, population, outline map, basic facts).
2. Current state of urban transport systems and service (brief explanation of main networks and systems, key connections, major transport issues, urban transport situation, congestion issues, urban transport policies, ongoing projects, tc-3/4 pages)
3. Data collection approachfor SUTI (brief explanation of data collection approaches, officials met, main sources of information, preliminary survey, interpretation, aggregation of data, panel, experts and city officials concurring with the input data on various indicators – any other difficulties in data collection – how it was overcame)
4. Data for SUTI (include plan, etc .)
   a. Indicator 1
   b. Indicator 2
   c. Indicator 3
   d. Indicator 4
   e. Indicator 5
   f. Indicator 6
   g. Indicator 7
   h. Indoactro 8
   i. Indicator 9
   j. Indicator 10
5. Analysis of data (input data in Excel sheet and results)
   a. Spider diagram (interpretation of results, observation etc)
   b. SUTI (interpretation of value, index numbers, observation etc)
6. Perspective on SUTI pilot exercise
7. Useful references and persons, experts and officials met
8. Annexes; useful data and material

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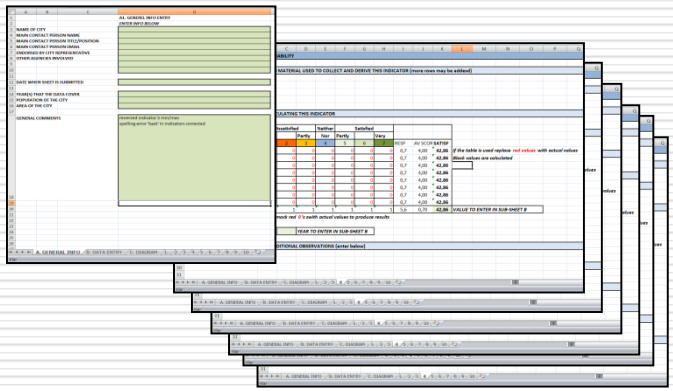
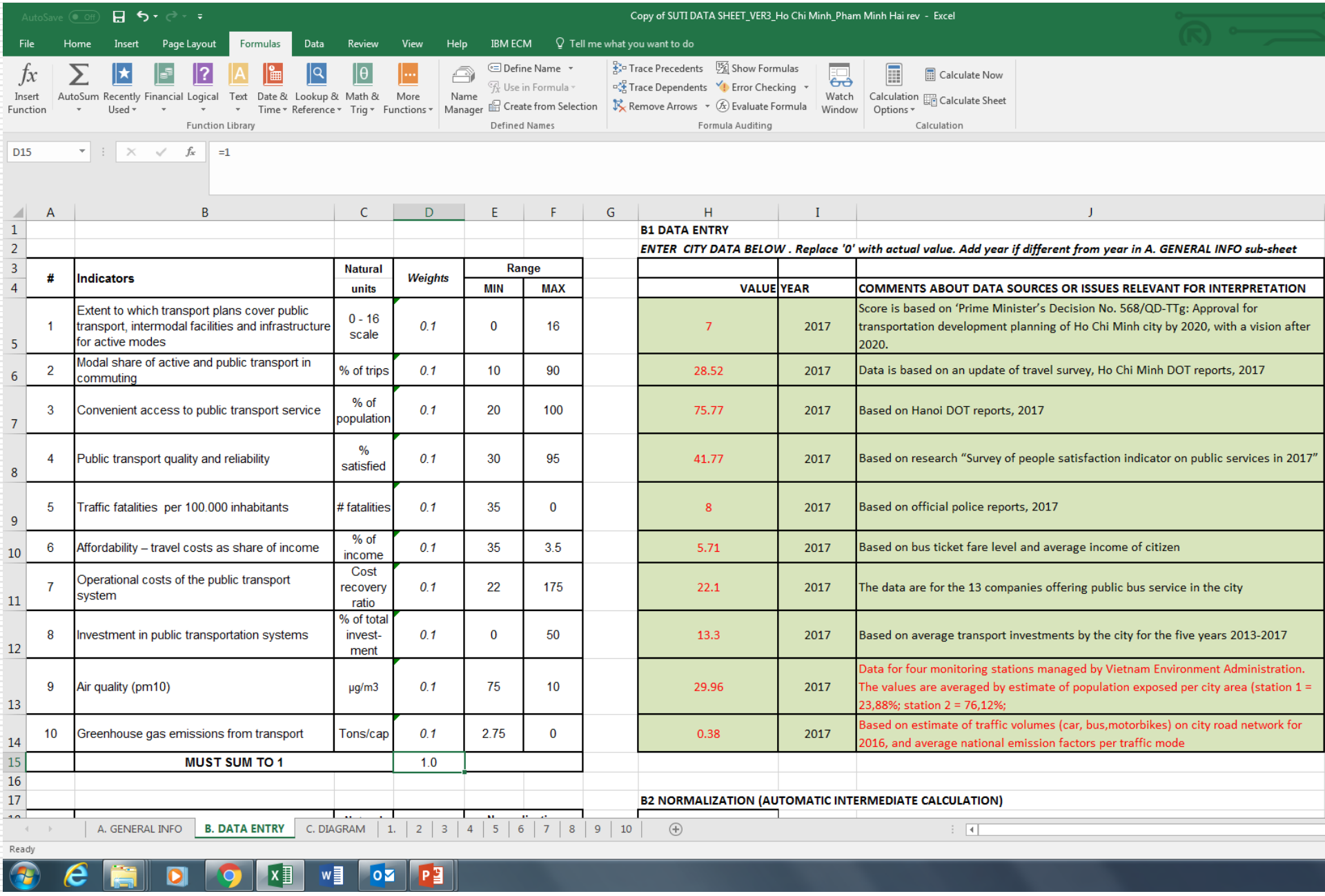
SUTI Excel Sheet



Data entry and normalization



Copy of SUTI DATA SHEET_VER3_Ho Chi Minh_Pham Minh Hai rev - Excel

File Home Insert Page Layout Formulas Data Review View Help IBM ECM Tell me what you want to do

Insert Function | AutoSum | Recently Used | Financial | Logical | Text | Date & Time | Lookup & Reference | Math & Trig | More Functions — Function Library

Name Manager | Define Name | Use in Formula | Create from Selection — Defined Names

Trace Precedents | Trace Dependents | Remove Arrows | Show Formulas | Error Checking | Evaluate Formula — Formula Auditing

Watch Window

Calculation Options | Calculate Now | Calculate Sheet — Calculation

D15 =1

B1 DATA ENTRY

ENTER CITY DATA BELOW . Replace '0' with actual value. Add year if different from year in A. GENERAL INFO sub-sheet

#	Indicators	Natural units	Weights	Range MIN	Range MAX	VALUE	YEAR	COMMENTS ABOUT DATA SOURCES OR ISSUES RELEVANT FOR INTERPRETATION
1	Extent to which transport plans cover public transport, intermodal facilities and infrastructure for active modes	0 - 16 scale	0.1	0	16	7	2017	Score is based on 'Prime Minister's Decision No. 568/QD-TTg: Approval for transportation development planning of Ho Chi Minh city by 2020, with a vision after 2020.
2	Modal share of active and public transport in commuting	% of trips	0.1	10	90	28.52	2017	Data is based on an update of travel survey, Ho Chi Minh DOT reports, 2017
3	Convenient access to public transport service	% of population	0.1	20	100	75.77	2017	Based on Hanoi DOT reports, 2017
4	Public transport quality and reliability	% satisfied	0.1	30	95	41.77	2017	Based on research "Survey of people satisfaction indicator on public services in 2017"
5	Traffic fatalities per 100.000 inhabitants	# fatalities	0.1	35	0	8	2017	Based on official police reports, 2017
6	Affordability – travel costs as share of income	% of income	0.1	35	3.5	5.71	2017	Based on bus ticket fare level and average income of citizen
7	Operational costs of the public transport system	Cost recovery ratio	0.1	22	175	22.1	2017	The data are for the 13 companies offering public bus service in the city
8	Investment in public transportation systems	% of total invest-ment	0.1	0	50	13.3	2017	Based on average transport investments by the city for the five years 2013-2017
9	Air quality (pm10)	µg/m3	0.1	75	10	29.96	2017	Data for four monitoring stations managed by Vietnam Environment Administration. The values are averaged by estimate of population exposed per city area (station 1 = 23,88%; station 2 = 76,12%;
10	Greenhouse gas emissions from transport	Tons/cap	0.1	2.75	0	0.38	2017	Based on estimate of traffic volumes (car, bus,motorbikes) on city road network for 2016, and average national emission factors per traffic mode
	MUST SUM TO 1		1.0					

B2 NORMALIZATION (AUTOMATIC INTERMEDIATE CALCULATION)

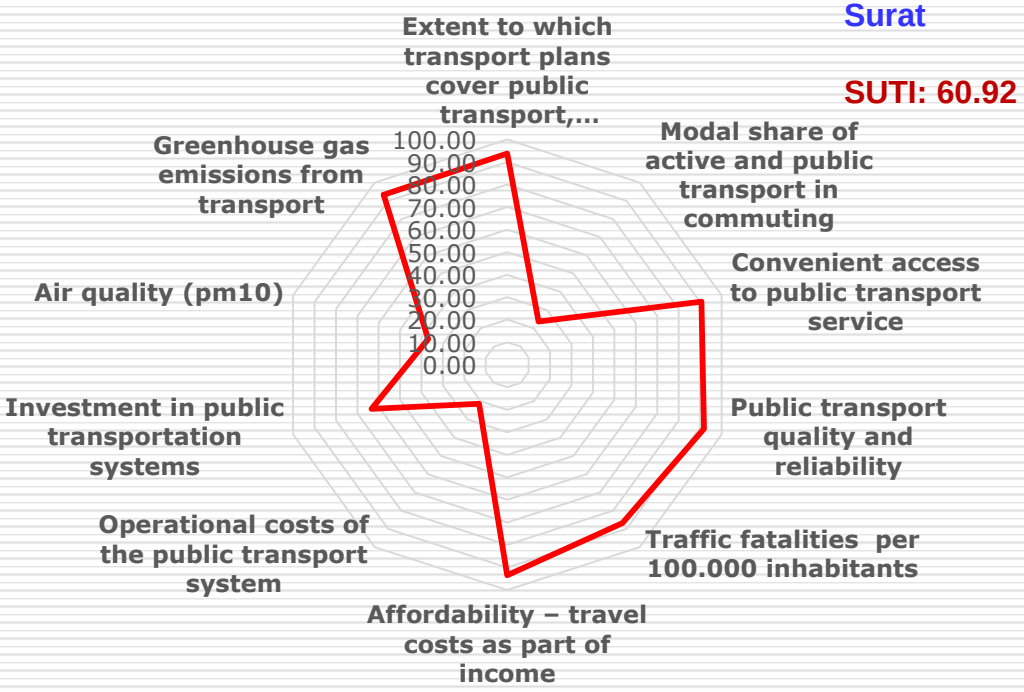
A. GENERAL INFO | B. DATA ENTRY | C. DIAGRAM | 1. | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10

Ready

SUTI Assessment of Indian Cities

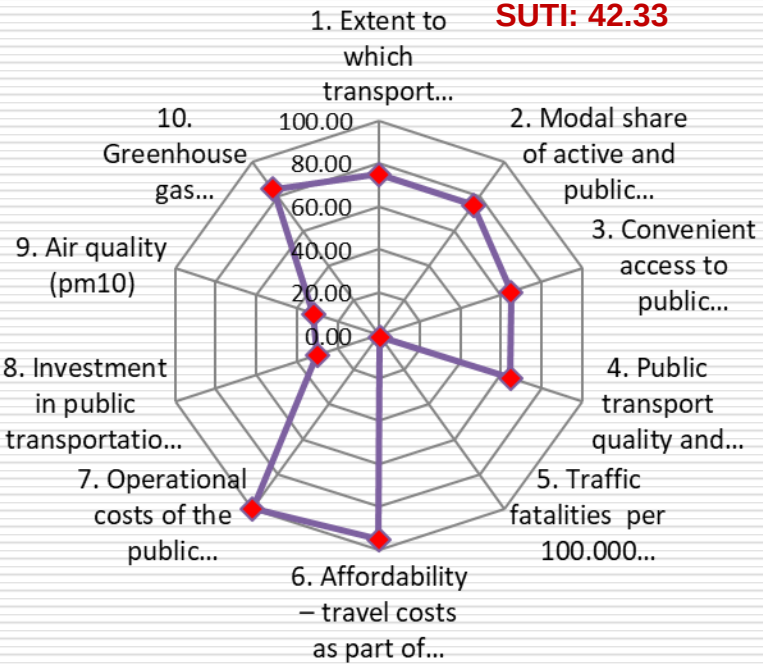
Surat

SUTI: 60.92



Bhopal

SUTI: 42.33



Regional SUTI Workshop, Colombo, 2017
Workshop on Urban Mobility, Dhaka, Sept. 2018
Regional Workshop Hanoi, Hanoi, 2019

2019 cities: Thimphu, Ulaanbaatar, Khulna, Bhopal, Tehran

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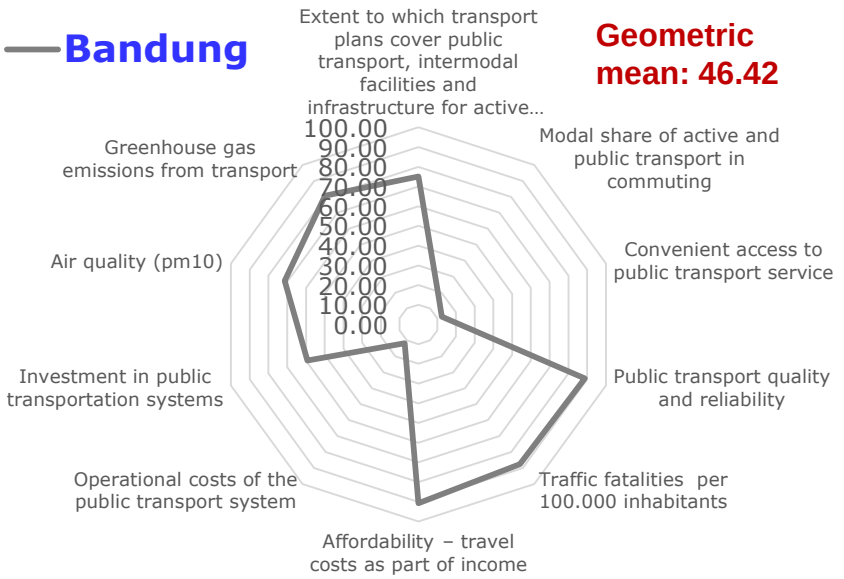
Application of SUTI in 2018

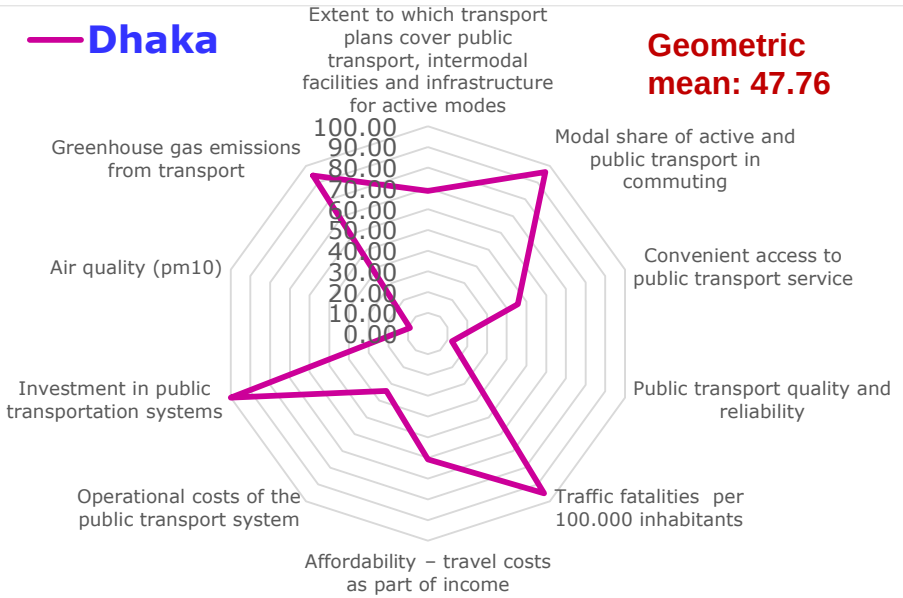
Bandung

Geometric mean: 46.42



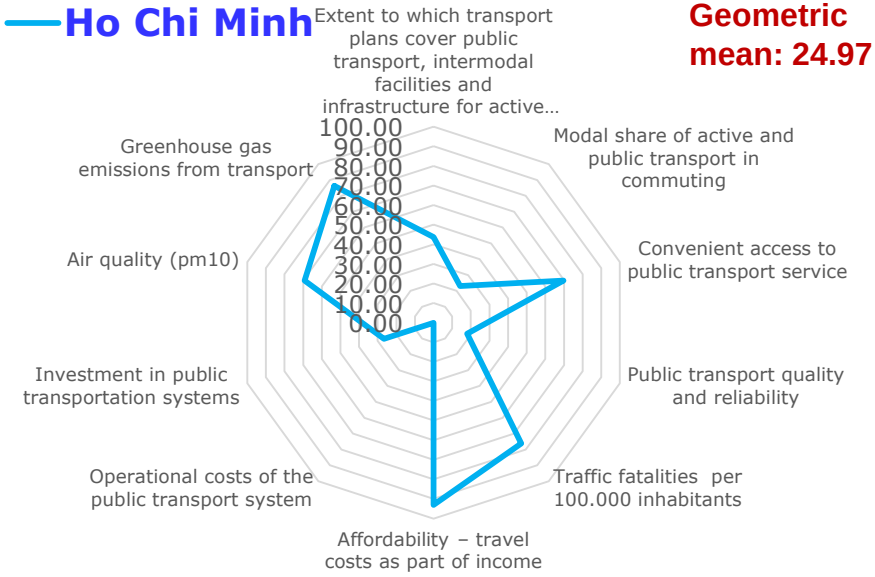
Dhaka

Geometric mean: 47.76



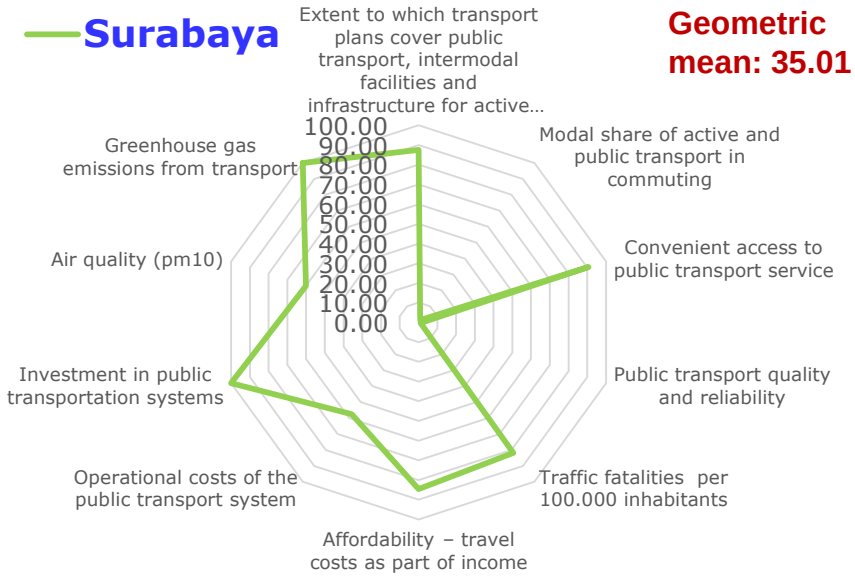
Ho Chi Minh

Geometric mean: 24.97



Surabaya

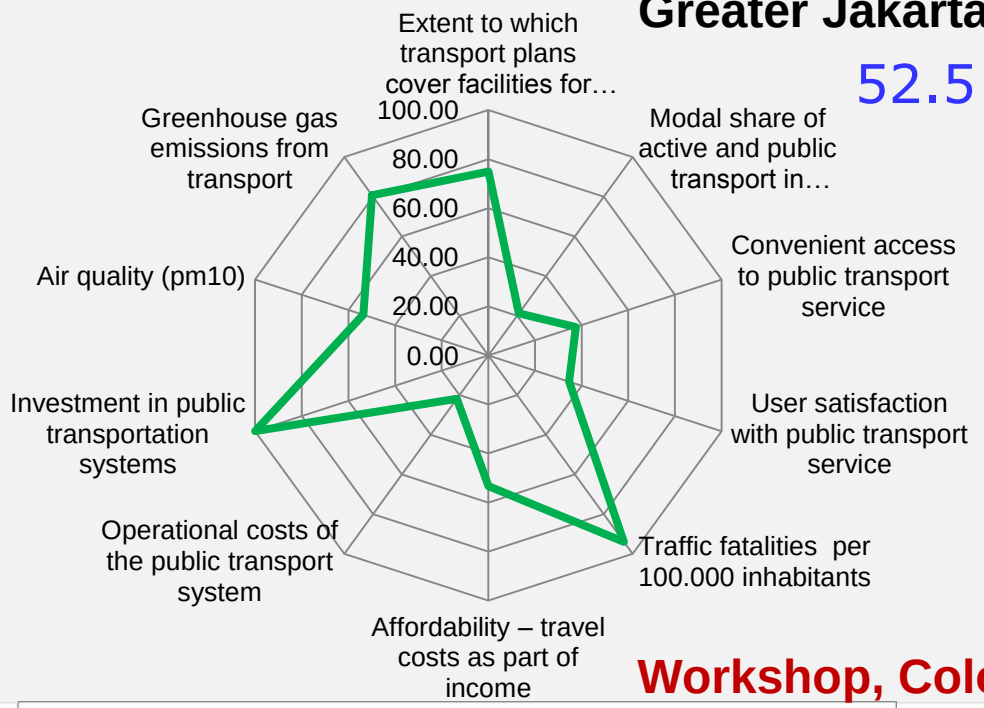
Geometric mean: 35.01



SUTI Pilot Application, 2017

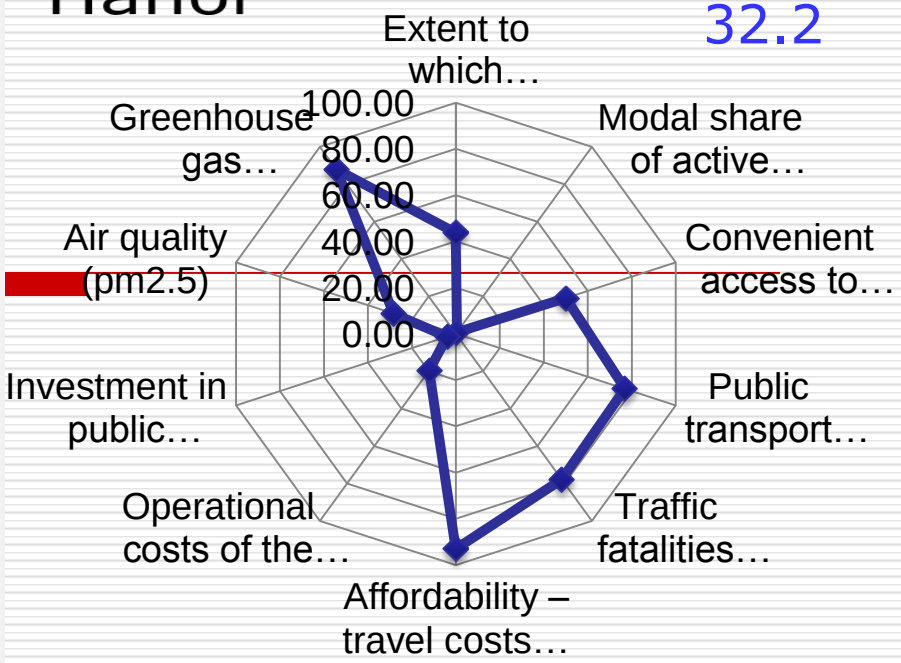
Greater Jakarta

52.5



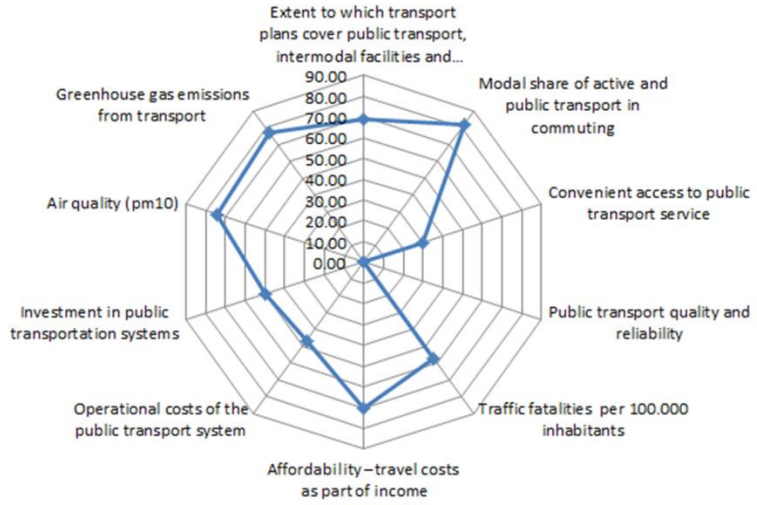
Hanoi

32.2



Workshop, Colombo, Oct 2018

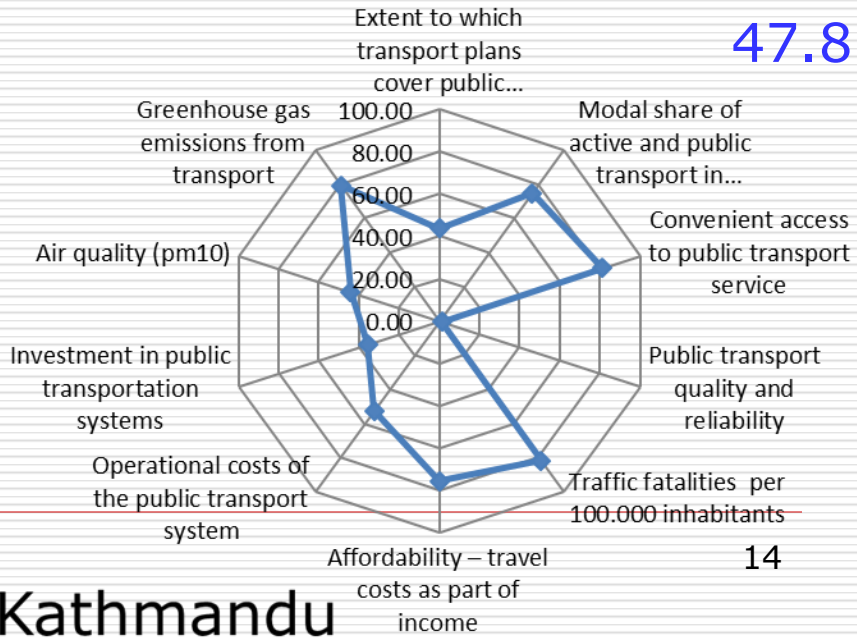
Colombo



32.7

Kathmandu

47.8



Key findings

- Much focus on planning but weak implementation
- Low mode share of Public Transport
- Various degree of accessibility
- Public perception low- quality and reliability of service
- Safety – looks good- concentration of population
- Low investment in Public Transport
- Mostly affordable - but operational costs- mostly subsidized
- Poor air quality
- GHG from transport still not concern

Innovative Examples

- Electric Mobility –Shenzhen, China, Nepal

- Public Transport- Metro, Bus, BRT: China, India, (Surat)
- Suroboyo Public Bus- Surabaya

- Infrastructure for walking & cycling
- Purabaya Bus Terminal

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Concluding Remarks

- Focus on implementation of mobility strategies & plans
  - Increase accessibility
  - Integration of services (Bus, BRT, Metro, LRT, NMT) and fare
  - Convenience - Integrated Transfer Stations
  - Affordability- how to make operation sustainable- public good
- Financing -Transport sector still has less projects in carbon financing, GEF, GCF and CDM- develop bankable projects
  - Other financing approaches PPP, value capture
- Strengthen capacity of different layers of government to implement – planning, management and governance
- SUTI tool to assess sustainability of urban transport systems and policies & track progress over time, VNRs

Thank you

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